



Building with conscience.

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**Sto Guide Specification 5200
StoTherm® ci**

Section 07 24 19

This specification is intended for use by the design/construction professional and any user of Sto products to assist in developing project specifications and to provide guidance on the application of StoTherm ci to vertical above grade exterior wall construction. StoTherm ci is a water-drainage exterior insulation and finish system (EIFS) that includes StoGuard® air and water-resistive barrier beneath it. The full system consists of six components: air and water-resistive barrier, adhesive, continuous insulation, reinforcing mesh, base coat, and finish. Notes in italics, such as this one, are explanatory and intended to guide the design/construction professional and user in the proper selection and use of materials. This specification should be modified where necessary to accommodate individual project conditions.

Design Guidance

General Description

StoTherm ci is an exterior insulation and finish system (EIFS) for use on vertical above grade exterior walls. It incorporates an air and water-resistive barrier (AWRB), and continuous exterior insulation attached with vertical ribbons of adhesive to the AWRB, which forms a drainage cavity. An impact resistant reinforced base coat is installed over the continuous insulation, which serves as a base for Sto high performance textured finishes, StoCast finishes that simulate the look of wood, brick, stone, and other architectural finish materials, or Sto Specialty finishes that create unique architectural surfaces.

Structural Considerations

StoTherm ci is a non-structural exterior wall cladding. It is non-load bearing and does not provide racking resistance, nor is it to be used as a base for mechanical anchoring of attachments such as signage or light fixtures. The structural backup wall, typically concrete, concrete masonry, or a frame wall with sheathing, must be designed and built for these purposes in accordance with the applicable building code.

Wind Load Resistance: design deflection criteria for StoTherm ci is L/240. StoTherm ci transfers positive wind loads to the supporting wall construction and resists negative wind loads via adhesive attachment to a substrate.

Generally, StoTherm ci is not the determinant of ultimate wind load capacity on frame walls. The supporting frame wall construction, or sheathing attachment, typically dictates ultimate load capacity of the assembly. Consult ICC ESR-1748 for allowable wind loads (published values have a safety factor of 3 applied to ultimate loads). In some cases, such as painted wall substrates, where adhesion may not be possible, full mechanical attachment is necessary. Refer to ICC ESR-1030 for information on allowable wind loads of mechanically attached StoTherm ci systems.

Fire Protection

StoTherm ci uses combustible foam plastic insulation as its insulating component. Use of foam plastics on exterior walls is covered in Chapter 26 of the IBC (International Building Code), which requires certain tests to allow use of foam plastics on noncombustible construction. Based on testing of StoTherm ci in accordance with NFPA 285 and NFPA 268 (and other fire tests and criteria listed in the code), the system complies with requirements for use on noncombustible construction (Types I, II, III, and IV). The system may also be used on combustible (Type V) construction.

Where a fire resistance rating is required, in general, StoTherm ci does not add to nor detract from the rating of an hourly rated load bearing or non-load bearing concrete, concrete masonry, or steel frame base wall assembly, based on testing in accordance with ASTM E119.

Refer to ICC ESR-1748 for more information on tested assemblies. Note that certain assemblies may be extended beyond the recognition provided in the ICC evaluation report through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular product or assembly in question.

See Section 2.5 of this specification for fireblocking requirements of the 2022 New York City Building Code.

Moisture Protection and Problem Prevention

StoTherm ci has redundant built-in moisture protection with StoGuard®, the air and water-resistive barrier component in the assembly. StoGuard is applied to the structural backup wall and protects against water damage from rain during construction when the building is “closed-in,” and in the event of a breach in the wall cladding while in service. StoGuard is available as a vapor permeable or vapor impermeable fluid-applied membrane.

The system also has built-in drainage capability. When properly combined with flashing, the system effectively drains water, based on testing in accordance with ASTM E2273.

StoGuard is not intended to correct faulty design or workmanship, such as the absence or improper integration of flashing, roofing, copings, and sealants in the construction, which shed water and prevent water entry into wall construction. StoGuard is not intended to

correct defective components of construction such as windows that leak into the wall assembly. Basic principles that should be followed in the design, detailing, and construction of the wall assembly include:

Flashing: provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.

Air Leakage Prevention: provide continuity of the air barrier assembly at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components, to minimize condensation caused by air movement. In most cases StoGuard Detail Components will facilitate detailing at these transitions. Take into account construction sequencing when designing an airtight assembly and the effects of airtightness on mechanical ventilation in the overall project design.

Water Vapor Diffusion: perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture by diffusion of water vapor. Adjust insulation thickness and/or other wall assembly components accordingly to eliminate or minimize the risk of a dew point in the wall assembly. Avoid the use of vapor retarders on the interior side of the wall in hot, humid climates.

Terminations and Sealants: Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through StoTherm ci (windows, doors, scuppers, mechanical, electrical, and plumbing penetrations, etc.).

Size joints at terminations based on anticipated movement and specify sealant and backer rod that is compatible with StoTherm ci, supported by the sealant manufacturer's certificate of compatibility. Typically, sealant is adhered to the StoTherm ci reinforced base coat or primed base coat.

Arrange for field adhesion testing to verify adhesion compatibility and obtain the sealant manufacturer's adhesion data to the sealant substrate(s).

Maintain air barrier continuity across joints. Drain joints to the exterior or provide other means to prevent or control water infiltration at joints.

Grade Condition: Provide minimum 6-inch (152mm) clearance above grade or as required by code. Do not specify StoTherm ci for use below grade.

Testing: conduct mock-up testing of the opaque wall-to-window assembly and other critical construction details to verify performance – air leakage resistance (ASTM E283), resistance to wind-driven rain (ASTM E331), and wind load resistance (ASTM E330).

Do not use StoTherm ci on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Prevent the accumulation of water behind StoTherm ci, either by condensation or water leakage into the wall construction, in the design and detailing of the wall assembly, and with proper sequencing and protective measures during construction.

For further information see Sto Tech Hotline No. 0403-BSc, *Critical Detail Checklist for Wall Assemblies*, Sto Tech Hotline No. 0603-BSc, *Moisture Control Principles for Design and Construction of Wall Assemblies*, and Sto Tech Hotline No. 1001-BSc, *Effects of Temporary Heating on Construction Materials in Cold Weather*.

Impact Resistance

StoTherm ci meets standard, medium, high, and ultra-high impact resistance ratings, depending on the type of mesh reinforcement used with the base coat, when tested in accordance with ASTM E2458. Ultra-high impact resistance, achieved by embedding Sto Armor Mat 15oz or 20oz reinforcing mesh in Sto base coat, is recommended at ground floors to a minimum height of 6 ft (1.8m) and at any other areas of abnormal stress or impact.

The addition of Sto Strike Defense, StoArmat Classic Plus with Sto Mesh embedded over the ultra-high impact resistant base coat assembly, provides a fortification layer that is resistant to impact from both blunt and sharp objects and woodpeckers.

StoTherm ci MVES with adhered thin brick, stone, or tile is another available option to provide an impact resistant finished will surface.

Refer to Sto Details.

The StoTherm ci system also meets FBC (Florida Building Code) and Miami-Dade County hurricane test protocols for large and small missile impact resistance (requires supplemental mesh reinforcement of the sheathing surface on frame walls with gypsum sheathing to achieve large missile impact resistance). Refer to Miami-Dade County NOAs (Notices of Acceptance).

Acoustics

Acoustical controls are achieved primarily in the base wall assembly, for example, in frame wall construction through the use of batt insulation in the stud wall cavity, gypsum sheathing, and wood or metal stud configuration. Refer to the *Gypsum Association Fire Resistance and Sound Control Design Manual* for technical data on performance of base wall assemblies.

Aesthetics

A wide variety of aesthetic choices and colors exist with Sto textured finishes, available in smooth, fine, medium, and coarse textures that are applied by trowel or spray application. Sto Specialty finishes offer unique architectural surfaces through the use of colored aggregate blends that are applied by trowel or spray application. StoCast finishes are factory made veneer units that achieve the look of wood, stone, brick, and other architectural finishes in a range of sizes, styles, and colors, with simplified application methods.

Dark colored finishes [LRV (Light Reflectance Value) less than 20] are not recommended unless reviewed by the design professional with regard to service temperature limitations of the foam plastic insulation [(limited to a maximum service temperature of 165°F (74.8°C)), and anticipated temperatures on the façade surface.

Architectural features – trim, sills, ledges, build-outs, reveals: all trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum ¾ inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on sloped surfaces. Where trim/feature or bottom surface of reveals project more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance. Refer to Sto Details.

Do not use StoTherm ci on top of parapets or on large weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing.

Joints

Joints are required at:

- Joints in the supporting wall construction such as expansion joints, control joints, and cold joints
- Perimeters of windows, doors, scuppers, fixture attachments, and similar objects in the wall construction
- Changes in substrate or support construction (e.g., masonry to frame wall) or other junctures with dissimilar construction
- Floor lines in multi-story wood frame wall construction
- Floor line deflection joints
- Changes in building height and other areas of stress concentration
- Panel-to-panel joints in prefabricated panel wall construction

Do not bridge expansion joints, control joints, or cold joints in wall construction with StoTherm ci.

Regulatory Compliance

The StoTherm ci System complies with the weather resistance requirements of the 2018 IBC Sections 1407.2 and 1407.4, and complies with requirements of Chapter 26 for use on noncombustible construction (Types I, II, III, and IV), and on fire-resistance rated wall assemblies. The system also complies with ASHRAE 90.1-2019 Section 5, Building Envelope, air barrier and continuous insulation requirements.

StoGuard complies with IBC, IRC, and IECC (International Energy Conservation Code) requirements as an air barrier material and water-

resistive barrier. It meets requirements as an air barrier material based on testing in accordance with ASTM E2178 and as an air barrier assembly based on testing in accordance with ASTM E2357. Refer to ICC ESR-1233.

All Sto architectural coatings, textured and specialty finishes, primers, sealers, waterproofers, and underlayments comply with South Coast Air Quality Management District (South Coast AQMD) volatile organic compound (VOC) requirements.

Thermal Insulation

StoTherm ci uses expanded polystyrene (EPS) insulation board as the thermal insulating component. The insulation board is applied adhesively to StoGuard on a supporting substrate to create a continuous exterior insulating thermal barrier. Thickness is limited based on structural considerations and fire testing. Minimum thickness is 1 inch (25mm). Maximum thickness is 12 inches (305mm) on noncombustible construction, and in some cases may be limited to six inches (152mm), depending on finish selection. Refer to ICC ESR-1748. If walls are required to have an hourly fire-resistance rating, maximum thickness is 4 inches.

Sto EPS Insulation conforms with ASTM E2430 and ASTM C578 Type I requirements. R-value is R-3.6 F·ft²·h/Btu per inch thickness at 75°F (RSI-0.634 K·m²/W per 25mm at 24°C).

Insulation material is flammable and must be kept away from flame, ignition sources, high heat and temperatures in excess of 165°F [74.8° C]).

Sustainability

StoTherm ci has high potential for LEED and other sustainability program credits based on efficient and effective use of a continuous air barrier, continuous exterior insulation, and the resulting energy savings and reductions in greenhouse gas emissions. The system also has positive impacts on life cycle energy use based on reduced dead load, which permits the use of lighter gage metal studs, and supporting structural members and foundation footings, when compared to other wall systems such as full thickness/weight masonry veneer walls. The use of light gage metal framing with recycled content and StoPanel prefabricated wall construction offers additional means to obtain credits. Refer to Sto Panel Technology information and ICC ESR-4500.

Additional Information

Refer to Sto product bulletins, guide specifications and guide details, technical hotlines, ICC Evaluation Reports, and other sources of information available at www.stocorp.com for more details on specific Sto products, features, benefits, and limitations that apply to StoTherm ci wall systems and components.

References

1. American Society of Testing and Materials International (ASTM), *Standard Specification for Rigid Cellular Polystyrene Thermal Insulation*, ASTM C578.
2. American Society of Testing and Materials International (ASTM), *Standard Specification for Mineral Fiber Block and Board Thermal Insulation*, ASTM C612.
3. American Society of Testing and Materials International (ASTM), *Standard Test Methods for Fire Tests of Building Construction and Materials*, ASTM E119.
4. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*, ASTM E283.
5. American Society of Testing and Materials International (ASTM), *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*, ASTM E330.
6. American Society of Testing and Materials International (ASTM), *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*, ASTM E331.
7. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Rate of Air Leakage Rate and Calculation of Air Permeance of Building Materials*, ASTM E2178.
8. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies*, ASTM E2273.
9. American Society of Testing and Materials International (ASTM), *Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems ("EIFS")*, ASTM E2430.
10. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies*, ASTM E2357.
11. American Society of Refrigeration and Air Conditioning Engineers (ASHRAE), *Energy Efficiency Standard for Buildings Except Low-Rise Residential Buildings*, ANSI/ASHRAE/IES Standard 90.1-2019.
12. Gypsum Association, *Fire Resistance and Sound Control Design Manual*, GA-600-2021.
13. International Code Council Evaluation Service, *Sto Rainscreen and Sto Rainscreen II Class PB Exterior Insulation and Finish Systems with Drainage*, ICC ESR-1030.
14. International Code Council Evaluation Service, *StoGuard with Sto Gold Coat, StoGuard with Sto EmeraldCoat, and StoGuard VaporSeal Air Barriers and Water-resistive Barriers, and StoEnergy Guard (StoGuard with Continuous Insulation)*, ICC ESR-1233.
15. International Code Council Evaluation Service, *StoTherm ci, StoTherm ci, and StoTherm ci with StoCast Finishes*, ICC ESR-1748.
16. International Code Council Evaluation Service, *StoPanel Classic ci, StoPanel Impact ci, StoPanel XPS, StoPanel Classic NEXt ci, and StoPanel Backup*, ICC ESR-4500.
17. International Code Council, Inc., *2018 International Building Code (IBC)*.
18. International Code Council, Inc., *2018 International Energy Conservation Code (IECC)*.
19. International Code Council, Inc., *2018 International Residential Code (IRC)*.
20. National Fire Protection Association (NFPA), *Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source*, NFPA 268.

21. National Fire Protection Association (NFPA), *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*, NFPA 285.
22. New York City Department of Buildings, 2022 *New York City Building Code*
23. Sto Corp., *Critical Detail Checklist for Wall Assemblies*, TH-0403-BSc.
24. Sto Corp., *Moisture Control Principles for Design and Construction of Wall Assemblies*, TH-0603-BSc.
25. Sto Corp. *Effects of Temporary Heating on Construction Materials in Cold Weather*, TH-1001-BSc.

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PART 1 GENERAL

1.1 SUMMARY

- A. Provide air and water-resistive barrier, and compatible EIFS for vertical above grade exterior walls
- B. Related Sections *(add/delete, depending on specific project requirements)*
 - 1. Section 03 00 00: Concrete
 - 2. Section 04 00 00: Unit Masonry
 - 3. Section 05 10 00: Structural Metal Framing
 - 4. Section 06 10 00: Rough Carpentry
 - 5. Section 06 16 00: Sheathing
 - 6. Section 07 26 00: Vapor Retarders
 - 7. Section 07 27 00: Air Barriers
 - 8. Section 07 50 00: Membrane Roofing
 - 9. Section 07 62 00: Sheet Metal Flashing and Trim
 - 10. Section 07 90 00: Joint Protection
 - 11. Section 08 10 00: Doors and Frames
 - 12. Section 08 40 00: Entrances, Storefronts, and Curtain Walls
 - 13. Section 08 50 00: Windows

1.2 SUBMITTALS

- A. Manufacturer's specifications, design guide and details, installation instructions, and product data
- B. Manufacturer's code compliance report
- C. Manufacturer's standard warranty
- D. Applicator's industry training credentials
- E. Samples for approval as directed by architect or owner
- F. Sealant manufacturer's certificate of compatibility
- G. Prepare and submit project-specific details (when required by contract documents)

1.3 REFERENCES

- A. ASTM Standards
 - 1. C150, Standard Specification for Portland Cement
 - 2. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - 3. C920, Standard Specification for Elastomeric Joint Sealants
 - 4. C1177, Specification for Glass Mat Gypsum for Use as Sheathing

5. C1382, Standard Method for Determining Tensile Adhesion Properties of Sealants When Use in Exterior Insulation and Finish Systems
 6. D1970, Standard Specification for Self-Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 7. D3273, Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 8. E84, Test Method for Surface Burning Characteristics of Building Materials
 9. E96, Standard Test Methods for Water Vapor Transmission of Materials
 10. E119, Method for Fire Tests of Building Construction and Materials
 11. E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under specified Pressure Differences Across the Specimen
 12. E330, Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 13. E331, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 14. E2178, Test Method for Air Permeance of Building Materials
 15. E2273, Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
 16. E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 17. E2430, Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems ("EIFS")
 18. E2486, Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
 19. E2568, Standard Specification for PB Exterior Insulation and Finish Systems
- B. ICC-ES Acceptance Criteria, Building Codes
1. AC 235, Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (July 2020)
 2. AC 212, Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing
 3. IBC-2018, International Building Code
 4. IRC-2018, International Residential Code
 5. IECC-2018, International Energy Conservation Code
- C. National Fire Protection Association (NFPA) Standards
1. NFPA 268, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
 2. NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components
- D. 2022 New York City Building Code
- E. South Coast AQMD (Air Quality Management District) Standards

1. Rule 1113, Architectural Coatings
- F. Other Referenced Documents
1. APA Engineered Wood Association E30, Engineered Wood Construction Guide
 2. ICC ESR-1233, StoGuard Air Barrier and Water-Resistive Barrier System, StoEnergy Guard (StoGuard with Continuous Insulation), and StoPanel Backup
 3. ICC-ESR-1748, StoTherm ci, StoTherm ci MVES, StoTherm ci with StoCast Finishes
 4. StoTherm EIFS: Installation Guide
 5. StoTherm EIFS Reference Guide: Repair and Maintenance
 6. Sto RapidGuard: Installation Guide
 7. StoGuard Conformable Membrane: Installation Guide
 8. 52s.xx, StoTherm ci Design Guide and Detail Booklet
 9. 52s.xx FB, StoTherm ci with Fireblocking, Compliance with 2022 New York City Building Code

1.4 DESIGN REQUIREMENTS

Consult StoTherm ci Design Guide and Detail Booklet, and the Design Guidance section in the front of this specification, for limits of system and guidance on design and design details. Coordinate this section with other material specification sections and detail drawings as applicable.

1.5 PERFORMANCE REQUIREMENTS

- A. Air and Water-resistive Barrier
1. Air leakage less than 0.004 cfm/ft² (0.02 L/s-m²) at 1.57 psf (75 Pa) when measured in accordance with ASTM E2178
 2. Assembly air leakage less than 0.04 cfm/ft² (0.2 L/s-m²) after conditioning protocol when measured in accordance with ASTM E2357
 3. Vapor Permeable, Water vapor permeance greater than 10 perms when measured in accordance with ASTM E96, Method B
 4. Vapor Impermeable, Water vapor permeance less than 0.1 perms when measured in accordance with ASTM E96, Method A
 5. No water penetration when subjected to sequential water spray of 2.86 psf (137 Pa), then 6.24 psf (299 Pa), for 15 minutes at each pressure interval, when measured in accordance with ASTM E331
 6. No water penetration at nail puncture after 72 hours at 40°F (4°C) when measured in accordance with ASTM D1970
 7. No mold growth at 70 days when measured in accordance with ASTM D3273
- B. EIFS Cladding
1. Meets or exceeds durability requirements of ASTM E2568
 2. Drainage efficiency greater than 95% when measured in accordance with ASTM E2273
 3. No water penetration when subjected to 75 minutes of water spray at 6.24 psf (299 Pa) and measured in accordance with ASTM E331

4. No mold growth at 60 days when measured in accordance with ASTM D3273
5. Flame spread and smoke development of lamina (base coat, reinforcing mesh, and finish) less than 25 and 450, respectively, when tested in accordance with ASTM E84
6. Meets acceptance criteria of NFPA 285 for use on non-combustible construction
7. No ignition when exposed to radiant heat in accordance with NFPA 268
8. Maintains hourly fire resistance rating of known, rated wall assembly when tested in accordance with ASTM E119
9. Meets standard impact resistance with Sto Mesh, meets Ultra-High impact resistance with Sto Mesh and Sto Armor Mat, when measured in accordance with ASTM E2486
10. Ultimate wind load capacity of plus or minus 188 psf (9.00 kPa) when measured in accordance with ASTM E330, and support wall construction achieves equal or greater ultimate load capacity

1.6 COMPLIANCE

- A. Air and Water-resistive Barrier
 1. Meets or exceeds maximum allowable material air leakage requirements of the 2018 IECC based on independent laboratory testing in accordance with ASTM E2178
 2. Meets or exceeds maximum allowable assembly air leakage requirements of the 2028 IECC based on independent laboratory testing in accordance with ASTM E2357
 3. Meets requirements of ICC AC 212 for coatings used as WRBs over sheathing
 4. Listed as compliant with 2018 IBC, IRC, and IECC in a current ICC-ES Evaluation Report ([consult ICC ESR-1233](#))
 5. Meets VOC emission standard of South Coast AQMD Rule 1113 for Building Envelope Coatings
- B. EIFS Cladding
 1. Meets performance and weather resistance requirements of 2018 IBC Sections 1407.2 and 1407.4, and complies with requirements of Chapter 26 for use on noncombustible construction (Types I, II, and IV) and in fire-resistance rated wall assemblies. Complies with requirements for use on combustible (Type V) construction.
 2. Meets performance requirements of 2018 IRC Sections R703.9.1 and R703.9.2
 3. Meets requirements of ICC AC 235 for EIFS clad drainage wall assembly
 4. Listed as compliant with 2018 IBC and IRC in a current ICC-ES Evaluation Report ([consult ICC ESR-1748](#))
 5. Textured finishes meet VOC emission standard of South Coast AQMD Rule 1113 for Architectural Coatings
 6. Complies with 2022 New York City Building Code requirements for fireblocking ([Refer to Section 2.5 of this specification for fireblocking component](#))
- C. Joint Sealant for Use with EIFS
 1. Conforms with ASTM C920: Type S, Grade NS, Use NT, A, M, Class 100/50
 2. Meets Federal Specification TT-S-00230C Type II
 3. Conforms with AAMA 808.3 (Type 1) Exterior Perimeter Sealing

1.7 QUALITY ASSURANCE

- A. Manufacturer Requirements
 - 1. Member in good standing of the EIFS Industry Members Association (EIMA) for over thirty (30) years
 - 2. Air and water-resistive barrier and EIFS manufacturer for a minimum thirty (30) years
 - 3. Manufacturing facilities in compliance with ISO 9001 Certified Quality System and ISO 14001 Certified Environmental Management System
- B. Contractor Requirements
 - 1. Engaged in application of similar systems for a minimum of three (3) years
 - 2. Knowledgeable in the proper use and handling of Sto materials
 - 3. Employ skilled mechanics who are experienced and knowledgeable in air and water-resistive barrier and EIFS application, and familiar with the requirements of the specified work
 - 4. Successful completion of minimum of three (3) projects of similar size and complexity compared to the specified project
 - 5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications
- C. Insulation Board Manufacturer Requirements
 - 1. Expanded Polystyrene (EPS) insulation board listed by an approved agency and in compliance with the applicable building code
 - 2. EPS board manufactured under Sto licensing agreement and EPS molder recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements
- D. Mock-up Testing
 - 1. Construct full-scale mock-up of typical air and water-resistive barrier and EIFS/window wall assembly with specified tools and materials and test air leakage, water infiltration and structural performance in accordance with ASTM E283, ASTM E331 and ASTM E330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
- E. Inspections
 - 1. Provide independent third-party inspection where required by code or contract documents
 - 2. Conduct inspections in accordance with code requirements and contract documents

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product
- B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32°C). Store away from direct sunlight
- C. Protect portland cement-based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location

- D. Store gun-grade air barrier component at temperatures between 40 and 80°F (4 and 26°C), and protect from freezing, moisture, direct sunlight, and keep away from sources of ignition
- E. Insulation material is flammable. Keep away from flame or ignition sources, direct sun exposure, high heat, and temperatures in excess of 165°F (73.8°C)

1.9 PROJECT/SITE CONDITIONS

Weather conditions affect application and drying time of products. Hot or dry conditions limit working time and accelerate drying and may require adjustments in the scheduling of work to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing (Exception: gun-grade air barrier component dries faster in damp or high humidity conditions)

- A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of air and water-resistive barrier and EIFS products
- B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)
- C. Provide protection of surrounding areas and adjacent surfaces from application of products

1.10 COORDINATION/SCHEDULING

The work in this section requires close coordination with related sections and trades. Sequence work to provide protection of construction materials from weather deterioration

- A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by code
- B. Provide roofing and protection at roof and floor levels to prevent excess water entry to the interior or into and behind the exterior wall during construction.
- C. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and water-resistive barrier
- D. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall
- E. Install window and door head flashing immediately after windows and doors are installed
- F. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior
- G. Install splices or tie-ins from air and water-resistive barrier over back leg of flashings, and similar details, to form a shingle lap that directs water to the exterior
- H. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface
- I. Schedule work such that the air and water-resistive barrier is exposed to weather no longer than 180 days
- J. Attach penetrations through the EIFS to structural support and provide watertight seal at penetrations

1.11 WARRANTY

- A. Provide manufacturer's standard warranty

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide air and water-resistive barrier and EIFS cladding components from single source manufacturer or approved supplier
- B. The following are acceptable manufacturers:
 1. Sto Corp. – Air and water-resistive barrier, EIFS Cladding, EIFS Accessories, EIFS Fireblocking
 - a. Sto Corp., 3800 Camp Creek Parkway, Building 1400, Suite 120, Atlanta, GA 30331
Tel: 800 221 2397, www.stocorp.com
 2. EPS Insulation Board – Sto licensed EPS Board molder (contact Sto Corp. for a list of licensed molders)

2.2 AIR AND WATER-RESISTIVE BARRIER

Refer to Sto Guide Details, Sto RapidGuard Installation Guide, and StoGuard Conformable Membrane Installation Guide to assist in selecting the proper detail components

- A. StoGuard Detail Components
 1. Sheathing Joint Treatment, Rough Opening (RO) Protection, Counterflashing, and Penetrations:
 - a. Sto Gold Coat, Sto AirSeal, or StoGuard VaporSeal: brush, spray or roller applied air and water-resistive barrier coating used with StoGuard Fabric reinforcement
 - b. Sto RapidGuard: single component rapid drying gun-applied STPE detail component
 - c. Sto Gold Fill: trowel applied detail component used with StoGuard Mesh, glass fiber self-stick reinforcing mesh
 - d. StoGuard Conformable Membrane – self-adhered membrane flashing for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, glass mat gypsum sheathing, and cementitious sheathing
 2. Static Joints and Seams
 - a. Sto RapidGuard: single component rapid drying gun-applied treatment for static joint transitions to dissimilar construction (i.e., masonry to frame wall), balcony floor slab-to-ceiling, and wall sheathing to foundation
 3. Static and Dynamic Joints
 - a. StoGuard Conformable Membrane: self-adhered membrane flashing for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, glass mat gypsum sheathing, and cementitious sheathing used to:
 - Seal joints and seams in wall sheathing
 - Seal static joints between dissimilar materials
 - Flash exterior wall openings and protect rough openings
 - Seal between window flange and wall sheathing
 - Connect to above grade foundation waterproofing
 - Connect to roof membrane
 - Seal around wall penetrations such as pipes, scuppers, vents
 - Back masonry wall ties
 - Seal dynamic joints in wall construction

Choose one coating and select application by Substrate (B1a, B2a, or B3), Medium Build (B1b, B2b, or B3), or High Build (B1c, B2c, or B3) as indicated

B. Air and Water-resistive Barrier Coating

1. Sto Gold Coat: ready mixed vapor permeable air and water-resistive barrier coating applied
 - a. By substrate as follows:
 - Glass Mat Gypsum: apply one coat at minimum 10 mils WFT
 - Plywood: apply one coat at minimum 10 mils WFT
 - Cement Board: apply one coat at minimum 10 mils WFT
 - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
 - CMU: apply two or three coats at minimum 20-60 mils WFT.
 - Concrete: apply one coat at minimum 10 mils WFT
 - b. To a Medium-Build in one or two coats to achieve minimum 20 mils WFT (if applied by roller apply two coats to achieve minimum 20 mils WFT. For CMU substrates apply two or three coats to achieve 20-60 mils WFT).
 - c. To a High-Build in two or three coats to achieve 40 mils WFT (if applied by roller apply three or more coats as needed. For CMU substrates apply multiple coats to achieve 40-60 mils WFT).
2. Sto AirSeal: ready mixed vapor permeable air and water-resistive barrier coating applied
 - a. By substrate as follows:
 - Glass Mat Gypsum: apply one coat at minimum 20 mils WFT
 - Plywood: apply one coat at minimum 20 mils WFT
 - Cement Board: apply one coat at minimum 20 mils WFT
 - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
 - CMU: apply two or three coats at minimum 20-65 mils WFT.
 - Concrete: apply one coat at minimum 20 mils WFT
 - b. To a Medium-Build in one or two coats to achieve minimum 40 mils WFT (if applied by roller apply two coats to achieve minimum 40 mils WFT. For CMU substrates apply two or three coats to achieve 40-65 mils WFT).
 - c. To a High-Build in one, two or three coats to achieve minimum 65 mils WFT (if applied by roller apply minimum three coats to achieve minimum 65 mils WFT).
3. StoGuard VaporSeal: Class 1 vapor retarder coating for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, cementitious sheathing, and glass mat gypsum sheathing, applied by airless spray in one or two coats to achieve minimum 80 mils total WFT

Refer to Tables in Appendix for product names and combinations of products based on compliance with the 2018 IBC and 2018 IRC and select one in each category: Insulation Adhesive, Insulation Board, Base Coat, Reinforcing Meshes, Primer, and Finish. Consult Sto for any additional guidance on product selection.

2.3 INSULATION ADHESIVE *(refer to Tables in Appendix for guidance on product selection)*

- A. Sto one component polyurethane spray foam adhesive
- B. Sto factory blended one-component polymer-modified portland cement based adhesive
- C. Sto factory blended latex additive for use with Type 1 portland cement

2.4 INSULATION BOARD

A. Expanded Polystyrene Insulation Board

1. Sto EPS Insulation Board: nominal 1.0 lb/ft³ (16 kg/m³) Expanded Polystyrene (EPS) rigid foam plastic insulation board in compliance with ASTM E2430 and ASTM C578 Type I requirements, R-3.6 per inch (RSI – 0.63 per 25mm), listed, labeled, and furnished in accordance with Section 1.7C.

The fireblocking specified below is applicable only to buildings required to have fireblocking of exterior wall coverings in accordance with the 2022 New York City Building Code

2.5 FIREBLOCKING

A. Sto Lamella

1. Nominal 8.5 lb/ft³ (136 kg/m³) noncombustible, semi-rigid mineral wool insulation in compliance with ASTM C612

2.6 BASE COAT *(refer to Tables in Appendix for guidance on product selection)*

A. Cementitious Base Coat

1. Sto factory blended one-component polymer modified portland cement base coats: Sto Primer/Adhesive-B, Sto BTS Plus, Sto BTS Xtra
2. Sto factory blended latex admixture for use with Type 1 portland cement: Sto Primer/Adhesive

Use StoArmat Classic Plus non-cementitious base coat with Sto Mesh embedded as a woodpecker resistant fortification layer when applied over any Sto portland cement-base coat reinforced with Sto Armor Mat or Sto Armor Mat XX. It can also be used as a standalone base coat with Sto Mesh embedded

B. Non-cementitious Base Coat

1. Sto high impact ready mixed acrylic base coat material: StoArmat Classic Plus
2. Sto ready mixed acrylic base coat material: Sto RFP

Use waterproof base coat with standard reinforcing mesh over standard base coats (A or B above) at splash zones or sloped surfaces that exceed 2 inches (51 mm) from the face plane of the wall

C. Waterproof Base Coat *(product selection generally made based on applicator preference)*

1. Sto Flexyl: factory blended latex additive for use with Type 1 portland cement to form a waterproof base coat material
2. Sto Watertight Coat: two component kit consisting of factory blended latex additive and dry component that forms a waterproof base coat material (equivalent to Sto Flexyl)

2.7 REINFORCING MESHES

Designate areas with impact resistance other than "Standard" on architectural drawings

A. Open weave glass fiber reinforcing meshes treated for compatibility with Sto materials

1. Sto Mesh – nominal 4.5 oz/yd² (153 g/m²) for areas requiring standard impact resistance
2. Sto Mesh 6oz – nominal 6 oz/yd² (203 g/m²) for areas requiring standard impact resistance and high build base coat

3. Sto Intermediate Mesh – nominal 11.2 oz/yd² (380 g/m²) for areas requiring high impact resistance
4. Sto Armor Mat – nominal 15 oz/yd² (509 g/m²) for areas requiring ultra-high impact resistance
(recommended to a minimum height of 6 ft (1.8m) at ground floors and areas exposed to heavy pedestrian traffic)
5. Sto Armor Mat XX – nominal 20 oz/yd² (678 g/m²) for areas requiring ultra-high impact resistance
6. Sto Detail Mesh – nominal 4.2 oz/yd² (143 g/m²) for back wrapping, diagonal reinforcement at corners of openings, reveals, complex architectural features, and other areas of detail work

2.8 STRIKE DEFENSE *(optional, provides a fortification layer that is resistant to impact from both blunt and sharp objects and woodpeckers. It is installed only over ultra-high impact resistant base coat assemblies)*

- A. StoArmat Classic Plus - cement-free high build acrylic-based plaster material used with Sto Mesh to form Sto Strike Defense

2.9 PRIMER *(optional component, except for some specialty finishes – refer to finish product bulletin)*

- A. Sto brush, roller, or spray-applied primer as dictated by substrate condition or finish selection

2.10 FINISH *(refer to Tables in Appendix for guidance on product selection)*

- A. Sto trowel applied decorative and protective textured finish
- B. StoCast pre-formed decorative and protective finish with adhesive (and topcoat if applicable)
- C. Sto Signature and Sto Specialty finishes

2.11 JOB MIXED INGREDIENTS

- A. Water – clean and potable
- B. Type I portland cement in compliance with ASTM C150

2.12 ACCESSORIES

- A. Sto-Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement
- B. Sto Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return
- C. StoSeal® STPE Sealant - high-movement, low modulus, non-sag one-component silyl-terminated polyether joint sealant in compliance with ASTM C920 and tested in accordance with ASTM C1382

2.13 MIXING

- A. Refer to manufacturer's applicable product bulletins for mixing of materials

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Prequalify under Quality Assurance requirements of this specification (Section 1.7B)

3.2 EXAMINATION

- A. Inspect concrete and masonry substrates prior to start of application for:
 1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew, or other foreign substances
 2. Surface absorption
 3. Cracks—measure crack width and record location of cracks
 4. Damage and deterioration such as voids, honeycombs and spalls
 5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage
 6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 10 feet [6mm in 3 m] deviation in plane)
- B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
 1. Glass Mat Faced gypsum sheathing compliant with ASTM C1177 – consult manufacturer
 2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30
 3. Cementitious sheathing – consult manufacturer
 4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
 5. Fasteners seated flush with sheathing surface and not over-driven
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the air and water-resistive barrier or the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 SURFACE PREPARATION

- A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces
- B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces, and level concrete and masonry surfaces to comply with required tolerances
- C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness
- D. Remove fasteners that are not anchored into supporting construction and seal holes with air and water-resistive barrier detail material

- E. Seal over-driven fasteners with Sto air and water-resistive barrier detail material and install additional fasteners as needed to comply with fastener spacing requirement
- F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)
- G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing

3.4 INSTALLATION

- A. Install manufacturer's air and water-resistive barrier in conformance with manufacturer's written instructions (*refer to applicable Sto product bulletins and StoTherm ci Design Guide and Detail Booklets*)
- B. Install manufacturer's EIFS cladding in conformance with manufacturer's written instructions (*refer to product bulletins, StoTherm EIFS: Installation Guide, and Sto Therm ci Design Guide and Detail Booklets*)

3.5 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them
- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

3.6 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly
- C. Refer to Sto reStore Repair and Maintenance Guide (reStore Program) for detailed information on restoration – cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding

Appendix: StoTherm ci Cladding Components

Table 1. StoTherm ci Cladding Components with Sto Textured Finishes listed in [ICC ESR-1748](#)

Adhesive	Continuous Insulation	Base Coats	Reinforcing Meshes	Textured Finishes
Sto TurboStick Sto TurboStick Mini Sto BTS Plus Sto BTS Silo Sto BTS Xtra	Sto EPS Insulation Board ^{1,2}	Sto BTS Plus Sto BTS Xtra Sto BTS Silo ³ Sto RFP	Sto Mesh Sto Detail Mesh Sto Mesh 6oz Sto Intermediate Mesh Sto Armor Mat Sto Armor Mat XX	Stolit Stolit Milano Stolit X Stolit Lotusan
Sto Turbostick Sto TurboStick Mini Sto Primer/Adhesive Sto Primer/Adhesive-B	Sto EPS Insulation Board ^{1,2}	Sto Primer/Adhesive Sto Primer/Adhesive-B	Sto Mesh Sto Detail Mesh Sto Mesh 6oz Sto Intermediate Mesh Sto Armor Mat Sto Armor Mat XX	Sto Essence DPR Stolit Milano Stolit X

- NFPA 285 compliant with up to 12 inches (305mm) thick of Sto EPS Insulation Board. Refer to ICC ESR-1748, Table 4. Sto Armat Classic Plus base coat with Stolit finish is compliant with NFPA 285. Listing of Sto Armat Classic Plus in ICC ESR-1748 with Stolit (Table 1 in ICC ESR-1748) for use on noncombustible construction is pending.
- Fire resistance-rated assemblies evaluated and compliant with up to 6 inches (102mm) thick of Sto EPS Insulation Board except for systems which use Stolit X and Sto TurboStick or Sto TurboStick Mini adhesive. Refer to ICC ESR-1748, Table 5. Listing of StoArmat Classic Plus in ICC ESR-1748 for fire-resistance rated assemblies (Table 5 in ICC ESR-1748) is pending.
- Sto BTS Silo is not recognized for use with Stolit Milano and Stolit X finishes.

NOTE: Certain assemblies may be extended beyond the listed products and/or limitations, including Sto Signature and Sto Specialty finishes, through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular assembly in question

Table 2. StoTherm ci Cladding Components with Stolit HDP Textured Finish listed in [ICC ESR-1748](#)

Adhesives	Continuous Insulation	Base Coats	Reinforcing Meshes	Textured Finish
Sto TurboStick Sto TurboStick Mini Sto BTS Plus Sto BTS Silo Sto BTS Xtra	Sto EPS Insulation Board ^{1,2}	Sto BTS Plus StoArmat Classic Plus	Sto Mesh Sto Detail Mesh Sto Mesh 6oz Sto Intermediate Mesh Sto Armor Mat Sto Armor Mat XX	Stolit HDP

- NFPA 285 compliant with up to 12 inches (305mm) thick of Sto EPS Insulation Board and Sto BTS Plus base coat, and up to 4 inches (102mm) thick with StoArmat Classic Plus base coat. Refer to ICC ESR-1748, Table 4.
- Fire resistance-rated assemblies evaluated and compliant with up to 6 inches (102mm) thick of Sto EPS Insulation Board and Sto BTS Plus base coat. Refer to ICC ESR-1748, Table 5. Listing of StoArmat Classic Plus in ICC ESR-1748 for fire-resistance rated assemblies (Table 5 in ICC ESR-1748) is pending.

NOTE: Certain assemblies may be extended beyond the listed products and/or limitations, including Sto Signature and Sto Specialty finishes, through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular assembly in question.

Appendix: StoTherm ci Cladding Components (Continued)

Table 3. StoTherm ci Cladding Components with Sto Cast Finishes listed in [ICC ESR-1748](#)

Adhesives	Continuous Insulation ¹	Base Coat	Reinforcing Meshes	StoCast Finishes ²
Sto TurboStick Sto TurboStick Mini Sto BTS Plus Sto BTS Silo Sto BTS Xtra	Sto EPS Insulation Board ^{1,2}	Sto BTS Plus StoArmat Classic Plus	Sto Mesh Sto Detail Mesh Sto Mesh 6oz Sto Intermediate Mesh Sto Armor Mat Sto Armor Mat XX	StoCast Wood with StoCast Wood Adhesive and Topcoat ³ StoCast Brick with Sto-Bonding and Pointing Mortar

1. NFPA 285 compliant up to 6 inches (152mm) thick of Sto EPS Insulation Board and Sto BTS Plus base coat. Refer to ICC ESR-1748, Table 4

2. Fire resistance-rated assemblies evaluated and compliant with up to 4 inches (102mm) thick of Sto EPS Insulation Board and Sto BTS Plus base coat. Refer to ICC-ESR-1748, Table 5. Listing of StoArmat Classic Plus in ICC ESR-1748 for fire-resistance rated assemblies (Table 5 in ICC ESR-1748) is pending.

3. Topcoat is typically StoColor Wood Stain applied in two coats; or, any of the StoColor exterior topcoats may be used. Refer to StoColor and StoTique Product Bulletins.

NOTE: Certain assemblies may be extended beyond the listed products and/or limitations, including Sto Signature and Sto Specialty finishes, through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular assembly in question.

ATTENTION

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